the enzyme.

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17.021

Highly Susceptible Strains of Typhoid Bacilli Encountered in Jamaica

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Background: Unlike reports of multidrug-resistant *Salmonella enterica serovar typhi* (*S. typhi*) in countries around the world, strains encountered in Jamaica have been uniformly susceptible to all the anti-typhoid drugs and also to other antibiotics by disc method. We have been maintaining these isolates on Dorset-egg medium over the years. In this report, we examine the MICs of 4 front-line antibiotics against 41 unduplicated isolates(one from a patient) encountered in consecutive 17 years between 1984 and 2000 at the University Hospital in Kingston, Jamaica.

Methods: The MICs were determined by E test(AB Biodisk, Solna, Sweden) using *E. coli* ATCC 25922 as control. Manufacturers' instructions in regard to media, inoculum density and incubation parameters were followed strictly. Our observation of extremely low MICs (see results below) made us to do the tests repeatedly and read the results independently by each of us (NCB and OH) and repeat again if we differed in reading by more than one E test dilution.

Results: The MICs(μg/ml) of the four antibiotics were Chloramphenicol MIC range 2—4, MIC_{50} 3 and MIC_{90} 3; Ampicillin MIC range 0.125—1, MIC_{50} 0.25 and MIC_{90} 0.5; Trimethprim/Sulpha MIC range 0.023—0.064, MIC_{50} 0.032 and MIC_{90} 0.047; Ceftriaxone MIC range 0.023—0.047, MIC_{50} 0.032 and MIC_{90} 0.047. All isolates were susceptible. MICs were extremely low, fell in a narrow range and far below the standard susceptible(CLSI) Breakpoint MICs of the antibiotics. We have not seen any report of such a highly susceptible strains of typhoid bacilli from anywhere in the world.

Conclusion: Considering the growing increase of multidrug-resistant typhoid in countries around the world and reports of isolation of strains with MICs of front-line antibiotics of more than 256 μg/ml(Hirose K et al Antimicrob Ag Chemother 45:956—958,2001), the highly susceptible nature of strains encountered in Jamaica is noteworthy. These unique strains which we call 'Jamaica strains' have been persisting in this island country throughout the years.

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Carbapenem Resistance Mechanisms in *Acinetobacter spp.* Isolated from University of Malaya Medical Centre (Ummc)

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Background: Carbapenem-resistant *Acinetobacter spp.* have gained increasing significance as opportunistic pathogens in hospitalized patients. Carbapenem resistance is often associated with the loss and/or decrease in outer membrane protein and overexpression of multidrug efflux systems. In this study, we describe a study on carbapenem resistance mechanisms involved in *Acinetobacter spp.* isolated from UMMC.

Methods: 39 carbapenem-resistant clinical isolates of *Acinetobacter spp.* obtained from inpatients at the University Malaya Medical Centre were used in this study. Preliminary screening for carbapenemase production was carried out and IEF was determined in the strains. The isolates were analyzed for the presence of the blaIMP gene using PCR and confirmed by Southern hybridization to obtain the location of this gene. Other resistance mechanisms such the presence of AdeABC efflux pump genes were also determined by PCR followed by inactivation by plasmid insertion and the resultant mutants were tested for their antimicrobial susceptibilities. Presence of outer membrane proteins were determined by SDS-PAGE. Iron-regulated outer membrane proteins (IROMPs) were expressed under iron deficit conditions as these are possible targets of antimicrobial therapy. Thus, antibodies against these IROMPs were raised and bactericidal activity of the strains was determined.

Results: Out of the 39 strains only two strains, S26 and S90, both *A. calcoaceticus* were positive for the presence of metallo-β-lactamases. Both these strains had similar MIC values for imipenem, cefotaxime, and aztreonam at 32, 512, and 64 μg/ml respectively. IEF analysis showed that both strains had a band of pI 8.0 which corresponded to that of blaIMP-4, while an additional band of pI 7.0 was present in strain S90. Strains, S26 and S90, were PCR positive for blaIMP, while the remaining 37 harbored blaOXA-23. Amplification and subsequent nucleotide sequencing of the entire coding region of blaIMP confirmed the identity of the blaIMP amplicon to be blaIMP-4. Plasmid analysis revealed that only the two strains, S26 and S90, carried plasmids: 147, 63, 36 in both strains with an additional 7 kb plasmid in S26. Southern blot hybridization showed that the blaIMP-4 gene was located on the 36 kb plasmid in strain S26 and was confirmed to be located on Class 1 integron. Screening and nucleotide sequencing of the Class 1 integron revealed identical genes: blaIMP4, qacG, aacA4, and catB3 in the 2 strains. However, PFGE analyses showed that S26 and S90 had different genotypes. Screening of efflux pump genes showed that 36 strains harboured all the 3 genes (adeA, adeB, and adeC). Inactivation of these individual genes showed decreased antimicrobial susceptibility indicating its contribution towards the development of antimicrobial resistance. Besides that, all the strains showed loss of a 27 kDa OMP. The monoclonal antibodies produced showed bactericidal effect against the organism tested and it specifically killed

the bacteria grown in iron deficit medium. This suggests that the outer membrane protein also plays an important role in carbapenem resistance in *Acinetobacter spp*.

Conclusion: Multiple mechanisms involved for carbapenem resistance in *Acinetobacter spp*. and therefore, understanding carbapenem resistance mechanisms might be crucial for the development of novel therapeutic strategies. However, it will be an important approach in the near future if one attempt to develop possible targets of new agents to control antimicrobial resistance in nosocomial pathogens such as *Acinetobacter spp*.

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17.023

Antimicrobial Susceptibility and Serotype Distribution of Nontyphoid Salmonella Clinical Isolates in Seven Asian Countries, 2003—2005

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Background: Nontyphoid Salmonella infections are rampant in Asia but there has been no large scale collaborative study to evaluate the serotype distribution and antimicrobial susceptibility in this region.

Methods: Clinical isolates of nontyphoid Salmonella were collected from clinical specimens from 11 medical centers in 7 Asian countries from 2003 to 2005. Broth microdilution method was performed to determine the minimum inhibitory concentrations of 6 antimicrobial agents.

Results: A total of 400 clinical isolates were collected from Hong Kong, Korea, Philippines, Singapore, Sri Lanka, Taiwan, and Thailand. The overall susceptibility was higher to ceftriaxone (97%) and ciprofloxacin (95.5%) than to traditional antibiotics (chloramphenicol, 72.3%; trimethoprim/sulphamethoxazole, 71%; ampicillin, 65.5%; and tetracycline, 54.3%). Among these countries, isolates from Taiwan and Thailand showed higher resistance to each of the 4 traditional antibiotics (all $p < 0.001$), and those from Korea showed higher resistance to ciprofloxacin (13.5% vs 3.2%; $p = 0.004$). The multidrug-resistant rate (MDR) was significantly higher in isolates belonging to serogroups B (49.6%) and C1 (46.9%) than other serogroups (all $p < 0.004$). MDR was common in *S. Heidelberg* (100%), *S. Panama* (87.5%), *S. Virchow* (87.5%), *S. Choleraesuis* (85.7%), and *S. Typhimurium* (54.4%). High rates of reduced susceptibility to ciprofloxacin (MIC= 0.125—1 mg/L) were found in isolates from Taiwan (48.2%), Thailand (46.2%) and Korea (36.5%), especially in *S. Choleraesuis* (68.8%) and *S. Virchow* (75%). Overall decreased susceptibility to ceftriaxone (MIC>2 mg/L) remained low except isolates from Taiwan (40.7%) or isolates of *S. Typhimurium* (28.6%) and *S. Panama* (25%).

Conclusion: Ceftriaxone appears to be drug of choice in the treatment of invasive nontyphoid Salmonella infections. High rate of reduced susceptibility to ciprofloxacin in some Asian countries as well as in some Salmonella serotypes is a concern. Prudent use of antibiotics in both humans and food animals should never be overemphasized.

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17.024

Nationwide Surveillance of in vitro Activities of Tigecycline against Clinical Isolates of *Acinetobacter baumannii* in Taiwan

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Background: The Tigecycline In-Vitro Surveillance in Taiwan (TIST), initiated in 2006, is a nationwide surveillance program designed to monitor longitudinally the in vitro activities of tigecycline against commonly encountered resistant bacteria in Taiwan. This study aims to determine the in vitro activities of tigecycline against clinical isolates of *Acinetobacter baumannii* in Taiwan.

Methods: A total of 393 isolates of *A. baumannii* were collected from various sources of patients treated at 20 teaching hospitals. Minimum inhibitory concentrations (MICs) for tigecycline were determined by the broth microdilution methods according the guidelines described by Clinical and Laboratory Standards Institute (CLSI). The results were interpreted by the MIC criteria provided by U.S. FDA tigecycline susceptibility breakpoints listed for *Enterobacteriaceae* (S, $\leq 2\,\mu g/mL$; I, $4\,\mu g/mL$; R, $\geq 8\,\mu g/mL$). All isolates were also examined for susceptibility to other 11 antimicrobial agents using the disk diffusion method and the results were interpreted by the CLSI criteria.

Results: Of these *A. baumannii* isolates, 81.7% were susceptible to tigecycline by the broth dilution method. Susceptibility rates of tigecycline to several resistant phenotypes determined by the disk diffusion method are shown below.

Conclusion: Tigecycline exhibited good *in vitro* activities (>70%) against Taiwanese *A. baumannii* isolates, including various resistant phenotypes.

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